



**National
Aerospace
Laboratories**

Class **Unrestricted**
No. of Copies **8**

Title *Pattern Synthesis of Spherical Antenna Arrays*

Author/s Hema Singh, D Poovannan, Arpana Saad, R M Jha

Division ALD

NAL Project No: A-8-602

Document No. PD AL 0708

Date of issue May 2007

Contents Pages Figures ☒ Tables References

External Participation Nil

Sponsor x

Approval Head, ALD

Remarks x

Keywords Conformal antenna array, Spherical array, Equiangular geometry,
Icosahedron topology, Pattern synthesis

Abstract

Spherical antenna arrays are capable of providing extensive spatial coverage over a wide range of frequencies. Moreover the directivity of the array is almost invariant with beam steering. This report presents the theoretical analysis of the radiation pattern produced by the spherical antenna array. The study presented consists of two parts: (1) Choice of topology i.e. how the elements are arranged either in equiangular geometry or icosahedron geometry, and (2) Choice of amplitude distribution and theoretical analysis of the radiation pattern produced by a spherical antenna array. Further the variation of far-field amplitudes of spherical array with frequency is analyzed. The compensation coefficient is included in the expression of radiation pattern in order to study the wideband behaviour of the spherical array, with both the zero inter-element spacing and the icosahedron-based spherical array. Computed results are validated against those in literature.